Editorial

Machine learning and soft computing are the two vast, versatile and overlapping research areas with enormous and diverse applications. Machine learning and Soft Computing both leads to the development of intelligent systems being used in everyday life ranging from search engines and credit card fraud detection to stock market analysis. Broad areas of machine learning problems involve classification, clustering, regression, information retrieval, recognition, optimization and prediction related problems. Some of the most widely used methods for solving the above mentioned problems classified into supervised and unsupervised learning methods which includes statistical models, inductive logic programming, decision and regression trees, probabilistic networks, case-based methods and ensemble methods etc. Various learning based approaches such as analogical learning methods, explanation-based learning, evolution-based methods, learning visual patterns from data, learning from instruction, reinforcement learning, learning in integrated architectures, automated knowledge acquisition, multi-strategy learning and multi-agent learning.

Simultaneously, soft computing tools includes widely used techniques such as fuzzy, neural network based computing, expert Systems, stochastic and probabilistic computing, multi objective optimization, modeling of Perception and intelligence, and its diverse applications in computer graphics, pattern recognition, bio-mimetic pattern recognition, social network mining, intelligent decision making systems, industrial applications.

This Special issue entitled "Recent Advances in Machine Learning and Soft Computing" provides wide scope for the above mentioned problems and applications. More than 300 numbers of submissions have been received from diverse areas and only 50 (Fifty) of them are being included in this special issue keeping all the area of this discipline.

The papers submitted to this special issue include new learning algorithms supported by empirical, theoretical, psychological, or biological justification. Some of the papers present experimental results through simulations of their proposed systems designed intelligently to yield new insights regarding strengths and weaknesses of the proposed techniques. Some of the selected papers also enhances existing benchmark approaches and provide comparative results on the basis of performance, effectiveness and accuracy. Lastly some the papers develop new analytical frameworks based upon advanced theoretical studies and present well analysed computational models to solve the problems under consideration.

Section-I: Machine Learning

The field of machine learning as widely known is an emerging field of computer science that provides machines the ability to learn and act in unknown environment. Although, machine learning is considered to be evolved from pattern recognition and computational intelligence sub-fields of artificial intelligence, but it explores a wide range of problem areas like building algorithms for learning and forecasting future trends on the basis of past data, constructing dynamic algorithms and programs that changes decisions with the change of data over time, building models from sample inputs instead of using entire dataset. The problems that are being tried to solve are sometimes considered as infeasible and challenging, but can generate implicit and approximate solutions with the help of machine learning tools. Some of the most widely used tools include various frameworks, libraries, and methods are (i) decision tree learning (ii) association rule learning (iii) deep learning (iv) artificial neural networks (v) support vector machines (vi) clustering (vii) Bayesian networks (viii) reinforcement learning (ix) Sparse dictionary learning (x) Genetic algorithms (xi) rule-based machine learning (xii) learning classifier systems. Out of the selected papers the following papers use some of the machine learning tools for solving problems of different interest.

The first paper of this section entitled "An Affective Cognition based Approach to Multi-attribute

Group Decision Making", by Su Chong, et al. quantifies affective transitions and impact of external stimuli on the transitions by combining human personalities, moods, and emotional states. While the traditional multi-attribute group decision making (MAGDM) method faces difficulty in making group decisions with large data samples as they focus on gathering experts' judgement preferences, their proposed method provides insight considering affective cognition perspective. Their proposed method is a hierarchical affective cognition model which is based upon the closed-loop feedback control principle, and presents quantifying relationship between affective states and control parameters such as sub-attribute weights and expected intervals. They have claimed that their method helps in effectively assisting group decision making process.

The second paper entitled, "A robot demonstration method based on LWR and Q-learning algorithm", by Zhao Gaungzhe, et al. deals with a robot demonstration method by combining locally weighted regression (LWR) and Q-learning algorithm. They have devised a mapping between target values and actions, using LWR algorithm and action generated by generalization, which is not contained in the training set. Their proposed method which combines LWR with Q-learning adjusts parameters by compensating errors. They have used global state and decision space for approximation to fit regression learning to a small local space and reduces the dimension of reinforcement learning training along with improvement of convergence rate. They have also demonstrated the proposed technique with simulations.

The next paper entitled, "Multiple Query Optimization Approach Based on Hive+", by Han Ying, et al. have proposed a method to improve the processing efficiency for MapReduce batch query using a multiple query optimization approach. Their proposed approach is based upon Hive+, which reduces the number of MapReduce tasks for multiple queries and decreases the overhead of fault tolerance, thus improving efficiency of query. They have sued TPC-H benchmark test set for performing experiments which shows the improvisation and efficiency of batch query.

The next paper entitled, "Interactive programming approach for solving multi-level multi-objective linear programming problem" by Qiumei Liu and Yanmei Yang, deals with multi-level multi-objective linear programming (ML-MOLP) problems. They have used interactive programming approach to solve ML-MOLP problem optimally dividing the solution

process into two major stages namely the analysis and decision-making stages. In the decision making stage, they have used an evaluation function, which is constructed to express differences between objective and ideal values to transfer multi-objective problem to single objective problems.

The next paper, "An enhanced classification scheme with AdaBoost concept in BCI" by June-Hyoung Kim and et al. has proposed an improved classification method by using AdaBoost which is an extension of artificial intelligence (AI). Data set of brain-computer interface (BCI) has been used for simulating their proposed improvement to classify EEG (Electroencephalography)-based motor imagery signal using matlab tool. They have used the experimental result of AdaBoost for comparison with linear discriminant analysis for measuring classification accuracy, which they reported an improvement over earlier methods.

Next paper entitled "Uncertain rank correlation analysis based on normal interval value", by Bo Wang and et al. reported the modified conventional rank correlation analysis (RCA) in the context of uncertainty, by proposing an uncertain RCA, since conventional RCA is unable to deal with uncertainty existing in comprehensive evaluation. Their proposed technique uses the transformation and operation of the normal distribution interval-valued number as an extension, because this number is capable of expressing the uncertainty and fuzziness of decision-maker.

Next paper entitled "An incentive to share resource-based crowd funding and repeated game in green cloud computing", by Yan Sun and Fuhong Lin, reported a new cloud based resource-sharing model using the idea of crowd funding, which can be considered as a supplement to the traditional resource supply mode. In their model, the spare resources can be contributed by the users to cloud service providers in order to perform various cloud tasks and receive preferential pricing when they require resources. They have designed a set of incentives and punishment mechanisms that are based on the repeated game strategy, which encourages the users and ensures that the supporters of the cloud receive preferential price benefits by monitoring service providers.

The next paper entitled "Study on HEV's driving condition recognition method based on PSO algorithm", by Guohai Long and Wei Yi considers series–parallel HEV and identifies the slopes and loads, analysing the structural parameters of HEV's. Initially driving condition of the vehicle is identified by the proposed model and least square method is

used to establish the optimization goal function which is further trained using hybrid PSO algorithm for better accuracy calculation. They have validated the proposed method through experimental results and measured comparative errors for recognition.

Next paper entitled, "CST-Voting: A semi-supervised ensemble method for classification problems", by Georgios Kostopoulos, and et al., proposed a new semi-supervised ensemble-based classification algorithm to be used as voting methodology named CST-Voting. They have used ensemble methods for better performance and demonstrated the comparative experimental results of the proposed algorithm against other familiar semi-supervised learning techniques on benchmark datasets.

The next paper entitled, "Application of Bayesian belief networks and fuzzy cognitive maps in intrusion analysis" by Yit Yin Wee, and et al. considers the problem of modeling and analysing network intrusions using two major causal knowledge frameworks namely Bayesian belief networks (BBN) and fuzzy cognitive maps. In their proposed model, firstly BBN learns from network intrusion data and then generates fuzzy cognitive map (FCM). They have reported that FCM learns intuitive representation very well in complex domains. Finally their proposed model is exploited in detail to provide support for intrusion analysis in networks.

The next paper entitled "The Barabási and Albert scale-free network model" by Lei Zhu and et al. proposed a complex network model, named as *Preferential-Random network model*, introduces random attachment to BA scale-free model. Their experimental results show better performance revealing close ties between neighbours. They have also claimed that the proposed method can withstand against international attacks and provides an effective guidance for building reliable and realistic networks.

Next paper entitled "Coalition Game Based Relay Decision Distributed Learning in High Dynamic Heterogeneous Intelligent UAV Networks" by Changhua Yao, and et al. investigates the problem of energy optimization in heterogeneous UAV swarm network. They have proposed a relay selection based game model for UAV along with coalition formation algorithm that converges to stable state and optimizes energy of UAV swarm.

Next paper entitled "Enhancement of Speech using Deep Neural Network with Discrete Cosine Transform" by Rashmirekha Ram and et al. proposed a hybrid speech enhancement model combining Deep Neural Network and Discrete Cosine Transform-II techniques. They have used DCT-II coefficients for Deep Neural Network (DNN) for reducing noise and simplification of calculation.

Section-II: Soft Computing

Soft Computing is yet another overlapping field with multiple cross-disciplines using inexact solutions for solving NP-complete problems. It is capable of tolerating imprecision, uncertainty, and partial information to generate approximate solutions as finding exact solutions is sometimes not possible. However, the underlying mechanisms of various available soft computing based tools and techniques take inspiration from human behaviour and thinking, which afterwards extended to several other evolutionary approaches. Some of the most commonly used methods that are based upon soft computing include: (i) Fuzzy Logic (ii) Neural Networks (iii) Evolutionary Computation (iv) Reasoning based algorithms (v) support vector machines (vi) Metaheuristic algorithms etc. which were being applied by various researchers, reported in this special issue.

In the first paper of this section entitled, "Fuzzy C-Means Quantization based Automatic Extraction of Rotator Cuff Tendon Tears from Ultrasound Images", by Kwang Baek Kim and et al. addresses the Rotator cuff tear problem that causes shoulder pain and disability in elderly people. This paper proposes a fully automatic model that extracts partial/full thickness tear of rotator cuff tendon using Fuzzy C-Means based quantization method for classifying pixels and enhances image contrast using fuzzy stretching.

The next paper entitled "An Integrated Method based on Hesitant Fuzzy Theory and RFM Model to Insurance Customers' Segmentation and Lifetime Value Determination" by Yan Chun, and et al. integrates the modified fuzzy logic theory with RFM model for segmenting insurance customers by evaluating lifetime value with risk measurement. They have introduced a new indicator Claim to the existing RFM model for measuring customer's lifetime risk quantitatively. In order to solve uncertain information effectively, they have used various weighted attributes using hesitant fuzzy entropy and similarity measure theory based upon the hesitant fuzzy analysis.

The next paper entitled, "Multidimensional context-aware recommendation algorithm towards intelligent distribution of cold chain logistics", by Xiang Li and Zhijian Wang, has proposed a design

of a multidimensional context-aware recommender algorithm (MCARA), based upon the analysis of contextual information like time and position of user devices, obtained from cold chain logistics distribution. Li and Wang analyze this contextual information by carrying out fuzzy clustering to categorize historical data set.

The next paper entitled, "Automatic tracking steering system for off-centered flexible chassis steering axis based on fuzzy-PI composite control" by Shujie Song and Kangquan Guo proposes a control system to address the problem of inaccuracy and low efficiency of the steering system. This paper studies the steering control of flexible electric chassis of a four wheeler on the basis of off-centred steering axis module. The speed of the in-wheel motor is jointly controlled along with the locking torque of the electromagnetic steering by applying fuzzy-PI composite control which reduces the steering resistance, accelerates steering process when angular error of steering is big, thus stabilizing steering and improving accuracy.

Next paper entitled "A Modified Genetic Algorithm for Performance Improvement of Transform based Image Steganography Systems" by Jude Hemanth and et al. presents a modified GA-based approach to improve the stego-image quality. Their proposed modified GA technique determines optimal coefficients to improve overall system performance.

The next paper entitled, "A dual-objective vendor-managed inventory model for a single-vendor multi-retailer supply chain with fuzzy random demand" by Zhanzhong Wang, and et al. provides a numerical study for a dual-objective inventory model managed by vendor. The proposed system consists of a single vendor and three retailers in the supply chain. The retailer's demand in the proposed model is represented by a fuzzy random variable and a constant deterioration rate is incurred by the supplier. The dual objective of the proposed optimization model both minimizes the total cost as well as maximizes the service level provided under capital budget. The various constraints considered include ordering cost, holding cost, deterioration cost and transportation cost which is together considered as the total cost of the vendor. The proposed model is solved in an imprecise environment by transforming the fuzzy model into a crisp model.

The paper entitled, "Transformer fault diagnosis method based on graph theory and rough set" by Peng Lu and et al. addresses the problems of fault diagnosis in power transformers by combining graph theory

with rough set. The proposed approach utilizes the decision table and adjacency matrix concepts for fault diagnosis.

Next paper entitled, "Integrating Dynamic Malmquist DEA and Social Network Computing for Advanced Management Decisions" by Ming-Fu Hsu and et al. proposes a dynamic hybrid model to forecast operating performance of corporate usually considered as the key trigger of financial troubles. While existing performance measurement focuses on quantitative ratios, their proposed model considers both quantitative as well as qualitative metrics through balanced scorecards (BSC) and incorporates it with Malmquist DEA which captures time-varying information and handles multiple-input and output ratio.

Next paper titled, "A security-aware data replica placement strategy based on fuzzy evaluation in the cloud" by Wu Xiuguo proposed an intelligent solution for enhancement of cloud storage system performance on the basis of replication technology. Their paper proposed a five-dimensional model for placement of replica, and a used a security-aware algorithm to evaluate the placement of replica from security point. Their evaluation model utilizes a combination of fuzzy sets and entropy weights to perform extensive evaluation of candidate data centres.

Next paper entitled, "Forecasting model based on heuristic learning of high-order fuzzy-trend and Jump rules" by Hongjun Guan, and et al. addresses the problem of forecasting future performance of stock market indices by using a heuristic based learning approach that generates second-order fuzzy-trend jump rules from historical training data. They have forecasted the future performance of the Taiwan stock exchange (TAIEX) dataset on the basis of the jump rules. Further, the authors have also presented the proposed technique to Shanghai Stock Exchange Composite Index (SHSECI).

Next paper entitled, "A New Type Design of Lunar Rover Suspension Structure and its Neural Network Control System", by Lu Yang and et al. conducts a detailed dynamic analysis on the new type of suspension structure of Lunar Rover and presents a novel model with virtual simulation. Their proposed model demonstrates a six link double ring lunar rover suspension model along with the lunar rover path tracking neural network controller.

Next paper entitled, "Attack angle tracking for high speed vehicle based on variable structure and Taylor type FLNN neural network" by Junwei Lei and Huali

Wu presents a hybrid design for attack angle tracking controller considering variable structure and Taylor type FLNN neural network method as base.

Next paper entitled, "Calculating the Significance of the Automatic Extractive Text Summarization using a Genetic Algorithm" by Jonathan Rojas Simon and et al. presents a modified approach for determining the best sentence combination of the Document Understanding Conference (DUC)-2001 and DUC-2002 corpus. They have used Genetic Algorithm to rank the newest methods of the AETS. Their paper presents the extractive text summarization technique using three heuristics along with providing justifications for the upper and lower bounds.

Next paper entitled "A Computational Approach for Mining Cholesterol and their Potential Target against GPCR Seven Helices based on Spectral Clustering and Fuzzy c-Means Algorithms" by Ramamani Tripathy and et al. proposes a computational approach on the basis of Spectral Clustering that uses Fuzzy c-Means for mining cholesterol and identify potential targets by extracting heterogeneous type of sequence for cholesterol from GPCR super family.

Next paper entitled "Research on Intelligent Optimization of Parameters of Deburring Process with Fluid-impact to Automobile Master Cylinder Cross Hole" by Haiyan Hu and et al. reported the optimization of deburring process for achieving higher processing quality and efficiency in automatically adapting to change of processing state without affecting the processing quality. They have used fuzzy RBF expert system to optimize the processing parameters and PSO for double object optimization.

Next paper entitled, "Research on Prediction of Internet Public Opinion Based on Grey System theory and Fuzzy Neural Network", by Haixiang He presents a prediction model combining grey system theory and fuzzy neural network for conducting analysis of internet public opinion.

Next paper entitled "Research on the searching performance of flower pollination algorithm with three random walks", by Yangjun Gao and et al. explores the influence of searching performance of Flower Pollination Algorithm (FPA) with a different random walk and proposes a modified FPA using McCulloch's algorithm.

Next paper entitled "Remote Sensing Image Classification Based on Dynamic Co-evolutionary Parameter Optimization of SVM" by Xiaodong Yu and et al. analyzes classification performance of SVM parameters in remote sensing images and proposes a dynamic co-evolutionary algorithm (PSO-GA) com-

bining the characteristics of PSO and GA based techniques for optimizing SVM parameters. They have claimed that their proposed algorithm is capable of adjusting the selection probability of PSO and GA dynamically with improved convergence speed.

Next paper entitled "Sentence Features Relevance for Extractive Text Summarization, using Genetic Algorithms" by Eder Vazquez and et al. presents an advanced extractive text summarization technique by identifying relevant features from sentences using Genetic Algorithms. Their proposed method outperforms previous related works in two standard document collections and shows the relevance of these features.

Next paper entitled, "Fuzzy Techniques for IPO Underpricing Prediction" by David Quintana and et al. proposed an adaptive neuro-fuzzy inference systems and fuzzy rule-based systems with genetic optimization technique for IPO underpricing prediction.

Section-III: Applications

Machine learning and soft computing techniques are being widely applied for solving several complex problems of different disciplines. Some of the applications that has attracted the attention of many researchers include: (i) Automated theorem proving (ii) Bioinformatics (iii) Brain–machine interfaces (iv) Classifying DNA sequences (v) Object recognition (vi) Information retrieval (vii) Linguistics (viii) Natural language processing (ix) Medical diagnosis (x) Optimization and metaheuristic (xi) Recommender systems (xii) Robot locomotion (xiii) Opinion mining (xiv) Financial market analysis (xv) ranking using learning algorithms and many more. The following papers are selected to cover a wide range of applications.

The first paper of this section entitled, "Bioactive Molecule Prediction Using Voting Based Ensemble Method" by Faisal Saeed and et al. deals with predicting molecular compounds of drugs that are both biologically active and can interact with target drugs. Their work considers a chemical dataset consisting of both structurally heterogeneous and homogeneous molecules, which investigates majority voting ensemble method through different combinations of machine learning algorithms like Decision Tree, Support Vector Machine, k-Nearest Neighbour, Naïve Bayes and Random Forests.

The next paper entitled "Early warning classification of cluster supply chain emergency based on cloud

model and data stream clustering algorithm" by Xue Hong proposes a cloud model based algorithm for generating early warning indicators for cluster supply chain.

Next paper entitled "A hybrid information capturing methodology for price volatility and its application to financial markets" by Chuanhe Shen, and et al. proposed the problem solving method of non-linear dynamic noise uncertainty in financial markets using data mining techniques such as fuzzy support vector machine (FSVM), and prior wavelet denoising.

The next paper entitled, "A Trend Cloud Model based Approach for Anomaly Identification of Wind Turbine Gearbox", by Ruiming Fang, and et al. proposed the technique of identification of anomalies in wind turbine (WT) gearbox by analysing temperature trend. Their proposed approach adopts Support Vector Regression (SVR) in order to build two models for forecasting operating temperature of WT gearbox.

Next paper entitle, "Driving-Situation-Aware Adaptive Broadcasting Rate Scheme for Vehicular Ad hoc Network" by Fuad A. Ghaleb and et al. develops an adaptive broadcasting scheme which is based upon autoregressive models. Their proposed DSA-ABR contains two parts, the first part is a Self-Predictor and Neighbouring-Predictor algorithms, based on an adaptive version of the Extended Kalman Filter (EKF), which estimates the current mobility state, with the help of the previous mobility state and the second part consists of a Neighbouring-Predictor algorithm (DSA-EKF-NP) that predicts the omitted or lost beacon messages.

The next paper entitled "Cleaner Production Assessment of Group Company Based on Improved AHP and Grey Relational Analysis" by Jiangdong Bao, and et al. presents a technical study of cleaner production assessment as a measure of the state and level of cleaner production.

The next paper entitled "Simplified model for estimating the punching load and deformation of RC flat plate based on big data mining" by Chuanteng Huang and Zhijun Wang), proposed the validation method of accuracy of bending-shearing critical crack method (BSCCM), which studies various factors affecting punching shear strength and deformation using factor analysis and validates the reasonability and accuracy of the formulas using 432 tests data.

The next paper entitled "Modified J-A Model and Parameters Identification based on Data Mining" by Ran Zhao and Bowen Wang presents a modified version of Jiles-Atherton (J-A) hysteresis model, which

uses data mining techniques to identify model parameters from the raw measured data of magnetostrictive alloy.

The next paper entitled, "An analytical punching shear model of RC slab-column connection based on big data" by Chuanteng Huang, and et al. proposed a theoretical method for analysis the punching shear strength and deformation capacity. Their proposed model defines the demand curve by equilibrium of forces in slab sector and the capacity curve by the shear-compression layered model developed on the basis of biaxial strength theory of concrete.

The next paper entitled "Control Law Design for Elastic Aircraft Based on Intelligent Variable Structure" by Yiyin Wei, and et al. proposed a design of longitudinal attitude controller for unstable elastic aircraft that combines fuzzy sliding mode control method with classical attitude control structure to attain equilibrium state at the origin. They have claimed that their proposed design is consistent and stable through Lyapunov method used for stability analysis.

The next paper entitled, "Enhancement of small signal stability of power system using UPFC based damping controller with novel optimized fuzzy PID controller", by Narayan Nahak and et al. proposes an optimal fuzzy PID controller using a hybridized combination of PSO-GWO algorithm. It also considers integral of fuzzy weighted absolute error and comparative results against normal optimized PID controller justifies its effectiveness and enhancement of signal stability.

Next paper entitled "Detecting Opinion Leaders in Online Social Networks Using Hybrid Rank Algorithm" by Qiuli Qing and et al. proposes a page rank algorithm named HybridRank algorithm that analyzes topic-sensitivity considers temporal characteristics.

Next paper entitled "Application of Particle Filter Technical to Online Prognostics for Solenoid Valve" by Xilang Tang, and et al. addresses the problem of predicting Solenoid valves' (SVs) operation condition and remaining useful life (RUL) through a prognostic approach as failure of SVs, which may result in a system crash.

The next paper entitled, "On-road obstacle detection video system for traffic accident prevention" by Luis Alberto Morales Rosales, and et al. addresses the obstacle detection from video system on-road traffic accident prevention. Their proposed system detects obstacles from video analysis by extracting areas of interests from video scenes using rectangular window

observation and sample analysis based segmentation process.

The next paper entitled "Impact of polarity in deception detection" by Ángel Hernández-Castañeda and Hiram Calvo reported the study of effect of the polarity for detecting deception task generating a set of features. They have implemented the polarity classifier for generating negative and positive opinions using semantic and lexical methods, which are used for generating features and construct vectors.

The next paper entitled "Feasibility Study on the Rectifier Diode and Bridge Circuit Theory" by Kevin Putra Dirgantoro and et al. proposed a bridge circuit theory in a half-wave rectifier, which replaces two diodes from a block with two resistors out of the passive and active components and provides only one positive input.

The last but not the least, paper entitled "Composite Control of RBF Neural Network and PD for Nonlinear Dynamic Plants using U-Model" by Xu Fengxia, and et al. proposes a scheme that combines the stability of PD and the ability of the RBF for approximating functions with precisions for achieving exact tracking of nonlinear plants.

I am extremely thankful to Prof. Reza Langari, Editor-in-Chief of Journal of Intelligent & Fuzzy Systems for the kind support to bring out the special issue on "Recent Advancement of Machine Learning and Soft Computing". I am also equally thankful to Dr. Maarten Fröhlich, Publishing Editor for his constant support and guidance during the publication of this special issue. It would not have been possible without the help of anonymous reviewers, my colleagues and scholars whose support is highly appreciated. Lastly but not the least, I am thankful to all the paper contributors, for their contributions.

I am sure that the readers shall get immense ideas and knowledge from this special issue on Machine Learning and Soft Computing.

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Guest Editor, RAMLSC